

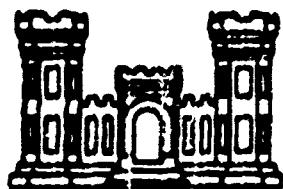
DEPARTMENT OF THE ARMY  
EUROPEAN DIVISION CORPS OF ENGINEERS

ENERGY ENGINEERING ANALYSIS PROGRAM  
EUROPE

VILSECK MILITARY SUBCOMMUNITY  
SEVENTH ARMY TRAINING COMMAND  
WEST GERMANY

Final Submittal  
VOLUME I  
EXECUTIVE SUMMARY

UNITED STATES ARMY  
CORPS OF ENGINEERS  
EUROPEAN DIVISION



FEBRUARY 1983

PREPARED BY  
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FY 80 ENERGY ENGINEERING ANALYSIS PROGRAM, EUROPE

FINAL SUBMITTAL

FEBRUARY 1983

THE FINAL SUBMITTAL CONSISTS OF TWO SEPARATE VOLUMES:

- o VOLUME I EXECUTIVE SUMMARY
- o VOLUME II ENERGY REPORT

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FY 80 ENERGY ENGINEERING ANALYSIS PROGRAM, EUROPE  
VILSECK  
FINAL SUBMITTAL  
VOLUME I  
EXECUTIVE SUMMARY  
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## EXECUTIVE SUMMARY

VILSECK

### 1. INTRODUCTION

The Energy Engineering Analysis Program for the three U. S. Military Subcommunities of Vilseck, Hohenfels and Vilseck in West Germany, has been authorized by the Department of the Army European Division, Corps of Engineers under Contract No. DACA90-80-C-0093 dated September 29, 1980, and subsequent Modifications:

POC001 dated April 27, 1981,  
POC002 dated September 29, 1981, and  
POC003 dated September 30, 1981.

### 1.1 OBJECTIVES OF THE ENERGY STUDY

The objectives of this contract, as explained in detail in Schedule of Title I Services for Energy Engineering Analysis Program, Europe dated September 12, 1981, are as follows:

- a. Develop a systematic plan of projects that will result in the reduction of energy consumption in compliance with the objectives set forth in the Army Facilities Energy Plan.
- b. Use and incorporate applicable data and results of related studies, past and current, as feasible.
- c. Develop a coordinated basewide energy study.
- d. Prepare Program Development Brochures (PDB), DD Forms 1391, and supporting documentation for feasible energy conservation projects.
- e. Include all methods of energy conservation which are practical (in so far as the state-of-the-art is reasonably firm) and economically feasible in accordance with guidance given.
- f. List and prioritize all recommended energy conservation projects.

## 1.2

### INCREMENTS OF WORK

The work to be performed under the contract has been divided into four Increments: A, B, F and G.

Increment A - Energy conservation investigations for buildings and processes.

Increment B - Energy conservation investigations of utilities and energy distribution systems, Energy Monitoring and Control Systems (EMCS), and existing energy plant investigations.

Increment F - Facilities Engineer conservation measures.

Increment G - Projects identified in Increments A and B that do not meet the FCIP criteria of  $E/C > 13$ , but may qualify as OMA or MMCA Projects.

## 1.3

### PHASES OF WORK

Increments A, B, F and G have been divided into three phases of work:

Phase I Data gathering and field trips.

Phase II Analysis of data, identification of potential projects, performance of feasibility and economic studies, and preparation of first page of DD Form 1391.

During this phase, all potential projects which produce energy and/or dollar savings should be identified and evaluated as to technical and economic feasibility.

Projects determined to be technically and economically feasible shall be combined into projects and ranked according to highest  $E/C$  ratio.

For FY 84, the minimum  $E/C = 13$  MBtu/kS

Phase III Preparation of DD Form 1391 and Project Development Brochures (PDBs); and preparation of documents presenting the results and recommendations of the study.

DD Forms 1391 and PDB's are not required for Increment F.

As a result of Modifications P00002 dated 29 September 1981, and P00003 dated November 2, 1981, it was negotiated that the Interim Submittal would not contain the Phase II effort of the EMCIS study, nor the Phase I and Phase II efforts of Increment F. These would be included in the Prefinal Submittal, after additional required data is obtained by surveying all three subcommunities in early 1982.

#### 3.4 PRESENT STATUS OF THE PROJECT

##### 1.4.1 SURVEY

Prior to the commencement of Phase I of the project, a meeting was held between the A-E and the Corps of Engineers, and out of the approximately 160 energy consuming buildings at Vilseck, 61 buildings were selected to be surveyed in detail.

It was agreed that the sample selected was representative of the entire community; and that the results of the survey and subsequent analysis of energy consumption and energy savings based on a representative building per type at each community could be extrapolated to obtain the energy consumption, energy savings and implementation cost for the entire community, based on the total square foot area of all buildings of each given type.

By this extrapolation method, values of basewide energy consumption, energy savings, and implementation costs could be estimated; and basewide ECIP projects determined.

##### 1.4.2 PRELIMINARY SUBMITTAL

The work listed below was accomplished and presented in the Preliminary Submittal:

- a. Compilation and analysis of the data and information received from each subcommunity.
- b. Review of the actual energy consumption of each subcommunity based on the energy consumption data collected; as well as a presentation of the projected energy consumption goals for each subcommunity based on the Army Facilities Energy Plan.

- c. Summarized tabulations of the survey data.
- d. Data of the surveyed buildings was input on Computer Program AXCESS.
- e. As a "sample-pilot" ECIP analysis, one building type was selected and analyzed for energy conservation in detail.
- f. The feasibility of Central Boiler Plant Projects was investigated.

The presentation of the Preliminary Submittal for Vilseck was made on 30 July, 1981 at Grafenwoehr.

Review comments on the Preliminary Submittal were forwarded to the AE by the Project Manager in his letter dated 15 October, 1981.

#### 1.4.3 INTERIM SUBMITTAL

The work listed below was accomplished and presented in the Interim Submittal:

- a. The data received from the Subcommunity was updated.
- b. Review of the actual energy consumption of the Subcommunity based on the energy consumption data collected; and a presentation of the energy consumption goals for the Subcommunity based on the Army Facilities Energy Plan.
- c. We presented an updated list of the representative buildings of each type selected for detailed energy conservation analysis.
- d. The Computer Program AXCESS was used to model and analyze all the buildings surveyed at the Subcommunity. Quantitative results of monthly energy consumption for space heating, domestic hot water, lighting and miscellaneous electricity usage has been obtained for each type of building.
- e. Increment A: Each of the buildings types was analyzed for energy conservation opportunities (ECOS) that involved modifying, improving or retrofitting the architectural features, HVAC systems, plumbing systems and lighting.

ECOs determined to be technically and economically feasible ( $E/C > 13$ ,  $B/C > 1$ ) were combined into Energy Conservation Projects (ECP's), and extrapolated to Energy Conservation Investment Projects (ECIP's).

f. Increment G: Projects considered in Increment A that did not meet the  $E/C > 13$  criteria and yet had a  $B/C > 1$  were recommended for implementation under OMA or MMCA funding.

A complete DD Form 1391 and complete PDB-I were presented for approval.

DD Form 1391s and PDBs are not required for Increment F.

g. Increment B: Information obtained on utilities and energy distribution systems, and existing energy plants (boilers) was presented and possible energy conservation measures analyzed.

#### 1.4.4 MODIFICATIONS P00002 AND P00003

These two modifications were negotiated and signed in September 1981.

It was agreed that the AE would perform a walk-through survey of every building in the community for Increment F's requirement to "provide recommendations for modifications and changes in system operation which are within the Facilities Engineer funding authority and management control", as well as for Increment B's EMCS analysis.

Only buildings larger than 5,000 GSF in area and consuming greater than 7500 gal/yr. of oil or 45 M-ton of coal or having a minimum 10 kw connected electrical load would be analyzed for EMCS feasibility.

The survey effort would be performed in early 1982.

#### 1.4.5 PREFINAL SUBMITTAL, INCREMENT F

157 sets of field survey forms were reviewed and from these a computer input sheet for each building surveyed was prepared. A computer data library was created storing all information gathered in the field which could be relevant to recommendations under investigation.

Tables 6-1 and 6-2 of Volume 2, the Energy Report, list the relevant data.

Computer aided manual calculations were used to obtain unescalated energy and cost savings and implementation costs. A computerized economic analysis program was used to produce E/C and B/C ratios.

Recent American and German Manufacturer's catalog data was obtained and included in the Appendices, Volume 7 of the Prefinal Submittal.

#### 1.4.5.1 RECOMMENDATIONS

All recommended energy conserving modifications were presented in Sections 7 and 8 of the Increment F Narrative, Prefinal Submittal. These sections are now Sections 8.7 and 8.8 of Volume 2, Energy Report.

A summary sheet for each Section 7 recommendations (Modification to Building Systems) includes the following:

- a. A brief description of reasons for the modification.
- b. Instructions for accomplishing the modification.
- c. An estimate of labor and material costs.
- d. An estimate of man-hours listed by trade, where relevant.
- e. The estimated dollar and energy savings.
- f. The results of an economic analysis: E/C AND B/C ratios.

The analyses of Section 8 recommendations (Modifications to M/O Systems) are contained within the Increment F Narrative, Prefinal Submittal.

A Summary of all modifications for Increment F listing costs, man-hours, dollar and energy savings was prepared and is presented in Table 2-1 of the Increment F Narrative, Prefinal Submittal. A copy can be found in Section 4 of this Volume. The Table lists the modifications in order from highest to lowest E/C ratio.

All energy conserving projects from Increments A, B and C and recommendations from Increment F have been consolidated, priority ranked and presented in Table 10-1 of the Increment F Narrative. Order of priority is from highest to lowest E/C ratio. A copy can be found at the end of this section.

Energy related areas of operation for which additional training of Facilities Engineering personnel is recommended has been listed in Section 12 of the Increment F Narrative.

Expendable equipment which should be changed to higher efficiency types when the next replacement occurs has been investigated. Recommendations are included in Section 13 of the Increment F Narrative, Prefinal Submittal.

#### 1.4.6 PREFINAL SUBMITTAL, INCREMENT B

Work listed below was accomplished and submitted for Increment B, excluding EMCS:

- a. We have obtained information on and studied in significant detail the subcommunities electrical system, street lighting system, potable water system, sewage collection and treatment system, hot water and steam distribution system; as well as existing energy plants consisting of Central Boiler Plants and Local-Building Boiler Plants.
- b. We have recommended several projects that require the modification of boiler plant controls such as installation of OA MW reset control, night set-back control and installation of time-clock. These projects however, have been presented under Increments A or G.
- c. We have developed electricity and fuel consumption load profiles for the past three years and presented them in Section 3.
- d. Graphical profiles of hourly MW demand occurring on a weekday, weekend and peak demand day have been developed, presented and discussed in Paragraph 7.2.4 for each month of FY 80. We have discussed existing peak demand limiting systems, and will investigate if the EMCS is feasible for further demand limiting.

e. Based on the AXCESS analysis of each building type, we have estimated the annual energy consumption and cost per square foot of each building type for Electricity, Fuel, Space Heating, Domestic Hot Water, Lighting and Miscellaneous Equipment. We have also projected these FY 80 to FY 84. Tabulated cost data has been presented in Section 9.

Work listed below was accomplished and submitted for Increment 9, EMCS:

- a. Supplement the site investigation with "as built" drawings, as well as sound engineering judgment.
- b. Interview administrative personnel to determine operating hours and procedures relative to the surveyed buildings.
- c. Identify EMCS energy conserving programs and strategies which might be appropriate for each of the buildings, listing the points required.
- d. Evaluate by computer analysis, energy conserved by these programs as well as their implementation costs in accordance with Energy Conservation Investment Program (ECIP) requirements.
- e. Make recommendations which may include in the EMCS some systems, points and/or programs which, while not directly related to energy savings, would provide management information and centralized control, making for more efficient facility operation.

#### 1.4.7 FINAL SUBMITTAL

During the period January 13, 1983 through February 12, 1983, the Preliminary, Interim and Prefinal Submittals have been compiled into a Final Submittal. A description of the compilation is as follows:

- a. For Sections 1 through 7 of the Final Submittal, the Interim Narrative was used as the basic text. Relevant material from the Preliminary was included.
- b. Section 8 incorporates Section 1 through 8 and 12 through 14 of the Increment 8 Narrative.

c. Sections 9 through 11 incorporates Sections 9 through 11 of the Increment F Narrative.

d. Section 12 incorporates the Increment B, EMCS Feasibility Study of the Prefinal Submittal.

The Final Submittal Executive Summary is made up of the Interim and the Prefinal Executive Summaries. These summaries have been adapted and brought up to date where necessary. The Final Submittal Executive Summary has been compiled as follows:

a. For Sections 1 through 4, the Prefinal Executive Summary Sections 1 through 4 have been used.

b. For Sections 5 through 8, the Interim Executive Summary Sections 2 through 5 have been used.

## 1.5 CONCLUSIONS

### 1.5.1 SAVINGS RESULTING FROM IMPLEMENTED ECO'S

The effects, in energy and cost savings, of implementing all Increment A, B, C, & G projects are summarized in Table 10-1, a copy of which is included hereafter. The percent savings for these projects are obtained using the known consumption for FY 75 from Table 3.3-2. This table is presented in Section 7. The total consumption for that year is 358,834 MBtu.

Increment A projects save 16,348 MBtu/yr, or 5% of the FY 75 total consumption. Increment B projects save 29,265 MBtu/yr, or 8% of the FY 75 total consumption. Increment F projects save 34,643 MBtu/yr, or 15% of the FY 75 total consumption. Increment G projects save 19,243 MBtu/yr, or 5% of the FY 75 total consumption. The total savings for all projects is 121,900 MBtu/yr, or 34% of the total FY 75 consumption.

The effect of Increments A, B, C & F in terms of FY 84 dollars is as follows. Increment A projects will save \$215,420 per year and will cost \$597,081. Increment B projects will save \$333,202 per year and will cost \$1,904,648. Increment F projects will save \$570,794 per year and will cost \$535,556. Increment G projects will save \$223,156 per year and will cost \$549,094. The projected cost of energy in 1984 is itemized in Table 3.3-1. Escalation rates and conversion factors are given in the Attachment to Table 3.3-1. The table and attachment can be found in Section 7.

1-01281  
1-01282

PROJECT	DESCRIPTION	OPEN SOURCE BUILDINGS	INCREMENTAL BUILDINGS	PART BACK BUILDINGS		TOTAL VARIANCE
				LAST	LAST	
1.1	Energy Saving Doors	Various Buildings	F	-	Immobile	1.160
1.2	Energy Saving Motors	Various Buildings	F	-	Immobile	1.160
1.3	Computer Partially Used Programs	Various	F	-	Immobile	1.160
1.4	Re Cold Water Cleaning Chemical or Disinfectant Wash Cycle	Re 22 Buildings	F	300.0	0.5	3.054
1.5	Boiler Water Treatment	Various Buildings	F	300.0	0.4	316.000
1.6	Repair Existing Nose harm on P. Shutter	7-261	F	200.0	0.6	2.910
1.7	Pop/Right Thermostatic Valve Shift. Righting Drift Control. Thermostatic Position Sensors	Reactive	C	419.0	0.6	2.140
1.8	Pop/oder Control above Control Systems	Various Buildings	F	133.2	0.6	0.830
1.9	Reliable for-1. Smaller controls or (1) 4 pens	Various Buildings	F	107.7	0.6	0.640
1.10	Smart Tree Management	Various Buildings	F	80.6	1.0	0.910





1942-1943  
EXHIBITS U. S. FEDERAL BUDGET STATEMENT

TABLE 4-1  
Incentives A, B, C, and C Penalties  
Public Sector

Project ID	Description	Affiliate Buildings	Incentive	E/C ratio	Rate Ratio	Type of use	Annual Savings (1980)	
							Cost (\$/sq ft)	Effect (\$/sq ft)
F-60	Vehicle Fleet Program System for Major Manufacturing Facilities	9-221 & 9-222	7	27.8	8.1	20,978	625	7,699
F-61	Street Lighting System Concept	9-121	8	21.1	8.1	17,925	360	3,761
F-62	Reduce the amount of heat load caused by Building Occupancy	9-122	7	37.6	8.1	8,263	76	609
F-63	DOE's Feasibility Study Program	Various Buildings	8	16.0	5.3	1,866,723	31,012	57,210
F-64	Programmatic Building Energy Systems Concept	9-123	7	16.3	6.7	310,964	5,066	71,155
F-65	Install Vehicle Fleet System	9-124	7	18.2	5.6	20,011	360	3,617
F-66	Programmatic Building Energy Systems Concept	9-125	7	19.4	5.6	50,125	569	3,042
F-67	Install Vehicle Fleet System	9-126	7	19.6	5.6	3,265	21	125
F-68	Programmatic Building Energy Systems Concept	9-127	7	19.7	5.6	62,968	658	3,947
F-69	Install Vehicle Fleet System	9-128	7	19.8	5.6	1,265	21	117
F-70	Multiple Room Control, Insulated Walls	9-129 & 9-130	7	20.0	5.6	22,5	315	1,365
F-71	Multiple Room Control Insulated Walls	9-131	7	20.1	5.6	10,054	109	599



### 1.5.2 PROJECTED CONSUMPTION

Table 1.5 shows the known FY 75 total energy consumption. The projected energy consumption after energy conservation projects is identified in the table under the column heading, 1985 MBTU (PROJECTED). It assumes that all the projects in Table 10-1 are completed by 1985. This projected energy consumption is the known FY 75 consumption times (1 - % reduction). It is the amount of energy that the buildings we studied will consume in 1985 after the energy conservation projects have been implemented.

The known consumption and the projected consumption are also given on a square foot basis. The quantity under the column heading, 1975 kBtu/sf (KNOWN), uses the 1975 gross floor area, from Table 3.2-1 and the quantity under the column heading, 1985 kBtu/sf (PROJECTED) uses the 1985 gross floor area.

New construction is accounted for in Table 1.5 under the column heading, 1987 MBTU FUTURE CONSTRUCTION; an estimate for the energy that will be consumed by Vilseck in 1987 is obtained by adding the expected energy consumption of new construction (based on Design Energy Budgets which are based on AR 415-26) to the 1985 MBTU (PROJECTED). A detailed treatment of future energy use resulting from facilities changes can be found in Section 4.7.

### 1.5.3 GOALS

The goal of the U. S. Army is a 20% reduction of energy consumption for building area constructed before FY 76. The goals have been calculated for the Vilseck ATC and presented in Table 3.2-1. A copy of which is included hereafter.

Table 1.5 presents the projected consumption for Vilseck. It will be compared to Table 3.2-1 and it will be shown that the goals are met. From line 3 of Table 3.2-1 a FY 85 consumption of 298,592 MBtu has been set for Building Area In Use Constructed Before FY 76. This is the building area that was studied for the Energy Report. From Table 1.5, the FY 85 consumption will be 236,831 kBtu if all of the recommendations in Table 10-1 have been implemented by that time. The goal is met by a margin of 61,761 MBtu. The consumption goals on a square foot basis are met by a correspondingly large margin. The goal is 176 kBtu/sf in FY 85. From Table 1.5, the projected 1985 consumption is 140 kBtu/sf, a margin of 36 kBtu/sf.

## VILSECK SUBCOMMUNITY

TABLE 1.5

PROJECTED TOTAL ENERGY CONSUMPTION MBTU/YEAR					
1975 ENERGY SP (KNOWN)	1975 MBTU (KNOWN)	REDUCTION	1985 MBTU /SF (PROJECTED)	1985 MBTU (PROJECTED)	INCREASE FUTURE CONST.
242	350,835	34	140	236,831	27
					300,775



When accounting for future construction and demolition, the goal for FY 85 is 374,167 MBtu. The estimate of future consumption, taking into account new construction, is 300,775 MBtu in FY 87. (Refer to Table 1.5). The goal is met by 73,394 MBtu/yr. This figure is conservative because the additional construction between 1985 and 1987 increases the estimated consumption.

## 2. INCREMENTS A AND G

### 2.1 REQUIREMENTS

Increment A deals with energy conservation investigations for buildings and processes. It deals with the investigation of ECIP projects which involve modifying, improving or retrofitting existing buildings, (including family housing), to include architectural and structural features, HVAC systems, plumbing systems, interior or exterior building and parking facilities lighting.

Increment G deals with projects developed in Increment A which result in energy savings but do not qualify under ECIP criteria.

A list of Energy Conservation Opportunities (ECO's) that we investigated is presented in Table 2.1.

### 2.2 SUMMARY OF RESULTS

For a project to qualify as an FY 84 ECIP project, it must have an E/C > 13, B/C > 1, and a Project Cost > \$100,000. In Table 6.1, Interim Submittal we have summarized all feasible ECIP projects. A copy is included hereafter.

Energy conservation projects with E/C < 13 or Project Cost < \$100,000 which cannot qualify as FY 84 ECIP projects, but which we feel are suitable for implementation from non-ECIP funding sources such as OMA or MMCA Programs, have also been included in Table 6.1 as OMA projects.

As indicated in Table 6.1, we have recommended 3 ECIP Projects and 19 OMA Projects for implementation.

The original Interim Submittal version of Table 6.1 listed the projects by building type. As a result of a suggestion by the Subcommunity, to consider the combining of smaller OMA projects, the present version of Table 6.1 groups projects by type (ECIP or OMA) and within each group lists projects by E/C ratio, highest to lowest.

The combining of projects eliminates the consideration of projects by building type. What is gained is an additional ECIP project. A copy of revised Table 6.1 is used in this volume.

Table 2.1

LEEDOM PROPOSED SCOR

- 1.....ATTIC FLOOR INSULATION
- 2.....ROOF INSULATION
- 3.....WALL INSULATION
- 4.....INSTALL STORM WINDOWS
- 5.....WEATHER SEAL GARAGE DOORS
- 6.....WEATHER SEAL ENTRANCE DOORS
- 7.....INSTALL RADIATOR ATC VALVE
- 8.....INSTALL O.A. RESET SYSTEM
- 9.....INSTALL NIGHT RETRACK
- 10....CONVERT STEAM TO W.H. HEATING
- 11....CONVERT TO CENTRAL BOILER
- 12....INSTALL PIPE INSULATION
- 13....INSTALL NEW BOILERS(S)
- 14....REPL. INCANDESCENT LIGHTING WITH HIGH PRESSURE SODIUM
- 15....REPL. MANIFOLDED AUTOMATIC BOILER
- 16....REPL. W.H. STORAGE TANK
- 17....WEATHER SEAL WINDOWS
- 18....INSTALL CEILING FAN FOR HEAT RECOVERY
- 19....INSTALL SPACE THERMOSTAT
- 20....INSTALL FAN ON/OFF CONTROL
- 21....CONVERT FROM MANUAL OA TO RESET TO AUTOMATIC
- 22....INSTALL HEATING ON/OFF CONTROL
- 23....INSTALL NIGHT RETRACK WITH OA TO RESET
- 24....INSTALL MULTIPLE ZONE CONTROL

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प्राचीन विजयनगर का इतिहास

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विद्या विद्या विद्या विद्या विद्या

PROJECT TITLE									
PROJECT NUMBER									
PROJECT DESCRIPTION									
1	2	3	4	5	6	7	8	9	10
1-100	1-101	1-102	1-103	1-104	1-105	1-106	1-107	1-108	1-109
1-110	1-111	1-112	1-113	1-114	1-115	1-116	1-117	1-118	1-119
1-120	1-121	1-122	1-123	1-124	1-125	1-126	1-127	1-128	1-129
1-130	1-131	1-132	1-133	1-134	1-135	1-136	1-137	1-138	1-139
1-140	1-141	1-142	1-143	1-144	1-145	1-146	1-147	1-148	1-149
1-150	1-151	1-152	1-153	1-154	1-155	1-156	1-157	1-158	1-159
1-160	1-161	1-162	1-163	1-164	1-165	1-166	1-167	1-168	1-169
1-170	1-171	1-172	1-173	1-174	1-175	1-176	1-177	1-178	1-179
1-180	1-181	1-182	1-183	1-184	1-185	1-186	1-187	1-188	1-189
1-190	1-191	1-192	1-193	1-194	1-195	1-196	1-197	1-198	1-199
1-200	1-201	1-202	1-203	1-204	1-205	1-206	1-207	1-208	1-209
1-210	1-211	1-212	1-213	1-214	1-215	1-216	1-217	1-218	1-219
1-220	1-221	1-222	1-223	1-224	1-225	1-226	1-227	1-228	1-229
1-230	1-231	1-232	1-233	1-234	1-235	1-236	1-237	1-238	1-239
1-240	1-241	1-242	1-243	1-244	1-245	1-246	1-247	1-248	1-249
1-250	1-251	1-252	1-253	1-254	1-255	1-256	1-257	1-258	1-259
1-260	1-261	1-262	1-263	1-264	1-265	1-266	1-267	1-268	1-269
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1-330	1-331	1-332	1-333	1-334	1-335	1-336	1-337	1-338	1-339
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1-370	1-371	1-372	1-373	1-374	1-375	1-376	1-377	1-378	1-379
1-380	1-381	1-382	1-383	1-384	1-385	1-386	1-387	1-388	1-389
1-390	1-391	1-392	1-393	1-394	1-395	1-396	1-397	1-398	1-399
1-400	1-401	1-402	1-403	1-404	1-405	1-406	1-407	1-408	1-409
1-410	1-411	1-412	1-413	1-414	1-415	1-416	1-417	1-418	1-419
1-420	1-421	1-422	1-423	1-424	1-425	1-426	1-427	1-428	1-429
1-430	1-431	1-432	1-433	1-434	1-435	1-436	1-437	1-438	1-439
1-440	1-441	1-442	1-443	1-444	1-445	1-446	1-447	1-448	1-449
1-450	1-451	1-452	1-453	1-454	1-455	1-456	1-457	1-458	1-459
1-460	1-461	1-462	1-463	1-464	1-465	1-466	1-467	1-468	1-469
1-470	1-471	1-472	1-473	1-474	1-475	1-476	1-477	1-478	1-479
1-480	1-481	1-482	1-483	1-484	1-485	1-486	1-487	1-488	1-489
1-490	1-491	1-492	1-493	1-494	1-495	1-496	1-497	1-498	1-499
1-500	1-501	1-502	1-503	1-504	1-505	1-506	1-507	1-508	1-509
1-510	1-511	1-512	1-513	1-514	1-515	1-516	1-517	1-518	1-519
1-520	1-521	1-522	1-523	1-524	1-525	1-526	1-527	1-528	1-529
1-530	1-531	1-532	1-533	1-534	1-535	1-536	1-537	1-538	1-539
1-540	1-541	1-542	1-543	1-544	1-545	1-546	1-547	1-548	1-549
1-550	1-551	1-552	1-553	1-554	1-555	1-556	1-557	1-558	1-559
1-560	1-561	1-562	1-563	1-564	1-565	1-566	1-567	1-568	1-569
1-570	1-571	1-572	1-573	1-574	1-575	1-576	1-577	1-578	1-579
1-580	1-581	1-582	1-583	1-584	1-585	1-586	1-587	1-588	1-589
1-590	1-591	1-592	1-593	1-594	1-595	1-596	1-597	1-598	1-599
1-600	1-601	1-602	1-603	1-604	1-605	1-606	1-607	1-608	1-609
1-610	1-611	1-612	1-613	1-614	1-615	1-616	1-617	1-618	1-619
1-620	1-621	1-622	1-623	1-624	1-625	1-626	1-627	1-628	1-629
1-630	1-631	1-632	1-633	1-634	1-635	1-636	1-637	1-638	1-639
1-640	1-641	1-642	1-643	1-644	1-645	1-646	1-647	1-648	1-649
1-650	1-651	1-652	1-653	1-654	1-655	1-656	1-657	1-658	1-659
1-660	1-661	1-662	1-663	1-664	1-665	1-666	1-667	1-668	1-669
1-670	1-671	1-672	1-673	1-674	1-675	1-676	1-677	1-678	1-679
1-680	1-681	1-682	1-683	1-684	1-685	1-686	1-687	1-688	1-689
1-690	1-691	1-692	1-693	1-694	1-695	1-696	1-697	1-698	1-699
1-700	1-701	1-702	1-703	1-704	1-705	1-706	1-707	1-708	1-709
1-710	1-711	1-712	1-713	1-714	1-715	1-716	1-717	1-718	1-719
1-720	1-721	1-722	1-723	1-724	1-725	1-726	1-727	1-728	1-729
1-730	1-731	1-732	1-733	1-734	1-735	1-736	1-737	1-738	1-739
1-740	1-741	1-742	1-743	1-744	1-745	1-746	1-747	1-748	1-749
1-750	1-751	1-752	1-753	1-754	1-755	1-756	1-757	1-758	1-759
1-760	1-761	1-762	1-763	1-764	1-765	1-766	1-767	1-768	1-769
1-770	1-771	1-772	1-773	1-774	1-775	1-776	1-777	1-778	1-779
1-780	1-781	1-782	1-783	1-784	1-785	1-786	1-787	1-788	1-789
1-790	1-791	1-792	1-793	1-794	1-795	1-796	1-797	1-798	1-799
1-800	1-801	1-802	1-803	1-804	1-805	1-806	1-807	1-808	1-809
1-810	1-811	1-812	1-813	1-814	1-815	1-816	1-817	1-818	1-819
1-820	1-821	1-822	1-823	1-824	1-825	1-826	1-827	1-828	1-829
1-830	1-831	1-832	1-833	1-834	1-835	1-836	1-837	1-838	1-839
1-840	1-841	1-842	1-843	1-844	1-845	1-846	1-847	1-848	1-849
1-850	1-851	1-852	1-853	1-854	1-855	1-856	1-857	1-858	1-859
1-860	1-861	1-862	1-863	1-864	1-865	1-866	1-867	1-868	1-869
1-870	1-871	1-872	1-873	1-874	1-875	1-876	1-877	1-878	1-879
1-880	1-881	1-882	1-883	1-884	1-885	1-886	1-887	1-888	1-889
1-890	1-891	1-892	1-893	1-894	1-895	1-896	1-897	1-898	1-899
1-900	1-901	1-902	1-903	1-904	1-905	1-906	1-907	1-908	1-909
1-910	1-911	1-912	1-913	1-914	1-915	1-916	1-917	1-918	1-919
1-920	1-921	1-922	1-923	1-924	1-925	1-926	1-927	1-928	1-929
1-930	1-931	1-932	1-933	1-934	1-935	1-936	1-937	1-938	1-939
1-940	1-941	1-942	1-943	1-944	1-945	1-946	1-947	1-948	1-949
1-950	1-951	1-952	1-953	1-954	1-955	1-956	1-957	1-958	1-959
1-960	1-961	1-962	1-963	1-964	1-965	1-966	1-967	1-968	1-969
1-970	1-971	1-972	1-973	1-974	1-975	1-976	1-977	1-978	1-979
1-980	1-981	1-982	1-983	1-984	1-985	1-986	1-987	1-988	1-989
1-990	1-991	1-992	1-993	1-994	1-995	1-996	1-997	1-998	1-999
1-1000	1-1001	1-1002	1-1003	1-1004	1-1005	1-1006	1-1007	1-1008	1-1009
1-1010	1-1011	1-1012	1-1013	1-1014	1-1015	1-1016	1-1017	1-1018	1-1019
1-1020	1-1021	1-1022	1-1023	1-1024	1-1025	1-1026	1-1027	1-1028	1-1029
1-1030	1-1031	1-1032	1-1033	1-1034	1-1035	1-1036	1-1037	1-1038	1-1039
1-1040	1-1041	1-1042	1-1043	1-1044	1-1045	1-1046	1-1047	1-1048	1-1049
1-1050	1-1051	1-1052	1-1053	1-1054	1-1055	1-1056	1-1057	1-1058	1-1059
1-1060	1-1061	1-1062	1-1063	1-1064	1-1065	1-1066	1-1067	1-1068	1-1069
1-1070	1-1071	1-1072	1-1073	1-1074	1-1075	1-1076	1-1077	1-1078	1-1079
1-1080	1-1081	1-1082	1-1083	1-1084	1-1085	1-1086	1-1087	1-1088	1-1089
1-1090	1-1091	1-1092	1-1093	1-1094	1-1095	1-1096	1-1097	1-1098	1-1099
1-1100	1-1101	1-1102	1-1103	1-1104	1-1105	1-1106	1-1107	1-1108	1-1109
1-1110	1-1111	1-1112	1-1113	1-1114	1-1115	1-1116	1-1117	1-1118	1-1119
1-1120	1-1121	1-1122	1-1123	1-1124	1-1125	1-1126	1-1127	1-1128	1-1129
1-1130	1-1131	1-1132	1-1133	1-1134	1-1135	1-1136	1-1137	1-1138	1-1139
1-1140	1-1141	1-1142	1-1143	1-1144	1-1145	1-1146	1-1147	1-1148	1-1149
1-1150	1-1151	1-1152	1-1153	1-1154	1-1155	1-1156	1-1157	1-1158	1-1159
1-1160	1-1161	1-1162	1-1163	1-1164	1-1165	1-1166	1-1167	1-1168	1-1169
1-1170	1-1171	1-1172	1-1173	1-1174	1-1175	1-1176	1-1177	1-1178	1-1179
1-1180	1-1181	1-1182	1-1183	1-1184	1-1185	1-1186	1-1187	1-1188	1-1189
1-1190	1-1191	1-1192	1-1193	1-1194	1-1195	1-1196	1-1197	1-1198	1-1199
1-1200	1-1201	1-1202	1-1203	1-1204	1-1205	1-1206	1-1207	1-1208	1-1209
1-1									

A new summary, Table 6.1A, Interim Submittal was created to indicate the types of ECOs included in each project. A copy of Table 6.1A is included hereafter.

If all these projects are implemented at a CWE PY 84 of \$1,146,175, the subcommunity will save 37,590.0 MBtu of energy, which is approximately 11% of its total energy consumption. The annual dollar savings will be \$458,576.

### 2.3 PROGRAM DOCUMENTS

A complete set of Program Documents, DD Form 1391s and PDS-1s, plus attachments, for each ECIP and OMA project are included in the Interim Submittal, Volume 5, Books 1 and 2.

### 3. INCREMENT B

#### 3.1 REQUIREMENTS

Increment B requires the following:

- a. Study the existing utilities and energy distribution systems, and existing energy plants; identify and analyze possible energy conservation projects.
- b. Determine the feasibility of an EMCS for building electrical, and mechanical systems and utility distribution.
- c. Develop a load profile for the past three years indicating the quantities of each energy source procured (heating oil, coal, electricity, etc.); and the peak demand loads, and essential loads.
- d. Develop graphic presentation of hourly KW demand for peak load/demand days. Develop procedures to reduce peak demand by load shedding.
- e. Project energy costs three years from the date of Contract award, and estimate the heating, lighting and other costs per square foot per year.

#### 3.2 SUMMARY OF RESULTS

Our investigation of potential Increment B projects resulted in two recommendations: a Street Lighting OMA project and an EMCS ICIP project. The combined energy savings amounts to 31,019 MBtu/yr with an equivalent dollar savings of \$337,239/yr. This represents a 8.5% reduction of FY 80 basewide energy consumption.

The major savings come from the EMCS recommendation. The Street Lighting project is documented in the Prefinal Submittal, Volume 5, OMA SL1. The EMCS is described in Volume 8 of this Pre-Final Submittal. A summary of the EMCS study is presented in Section 3.1 of this narrative.

The Interim Submittal describes our investigation of Increment B projects, excluding the EMCS study, and is summarized as follows:

- a. We have obtained information on and studied in significant detail the subcommunities electrical system, street lighting system, potable water system, sewage collection and treatment system, hot water and steam distribution system; as well as existing energy plants consisting of Central Boiler Plants and Local-Building Boiler Plants.
- b. We have recommended several projects that require the modification of boiler plant controls such as installation of OA HW reset control, night set-back control and installation of time-clock. These projects however, have been presented under Increments A or C.
- c. We have developed electricity and fuel consumption load profiles for the past three years and presented them in Section 3 of the Interim Submittal.
- d. Graphical profiles of hourly kw demand occurring on a weekday, weekend and peak demand day have been developed, presented and discussed in Paragraph 7.2.4 of the Interim Submittal, for each month of FY 80. We have discussed existing peak demand limiting systems, and will investigate if the EMCS is feasible for further demand limiting.
- e. Based on the AXCESS analysis of each building type, we have estimated the annual energy consumption and cost per square foot of each building type for Electricity, Fuel, Space Heating, Domestic Hot Water, Lighting and Miscellaneous Equipment. We have also projected these FY 80 to FY 84. Tabulated cost data has been presented in Section 3 of the Interim Submittal.

### 3.3 INCREMENT B - EMCS FEASIBILITY STUDY

#### 3.3.1 PURPOSE

The purpose of this study is to determine the technical and economic feasibility of utilizing Energy Monitoring and Control system (EMCS) techniques at the Vilseck Subcommunity, Vilseck, West Germany.

This effort is to develop a systematic plan to reduce energy consumption in compliance with the objectives put forth in the Army Facilities Energy Plan. Within the scope of this study, recommendations for the possible implementation of those objectives will be investigated.

### 3.3.2

#### PARAMETERS OF THE FEASIBILITY STUDY

Of the 160 buildings in the subcommunity, 104 are considered. Inclusion is based on engineering judgment for potential economic payback.

### 3.3.3

#### SCOPE OF WORK

- a. Supplement the site investigation with "as built" drawings, as well as sound engineering judgment.
- b. Interview administrative personnel to determine operating hours and procedures relative to the surveyed buildings.
- c. Identify EMCS energy conserving programs and strategies which might be appropriate for each of the buildings, listing the points required.
- d. Evaluate by computer analysis, energy conserved by these programs as well as their implementation costs in accordance with Energy Conservation Investment Program (ECIP) requirements.
- e. Make recommendations which may include in the EMCS some systems, points and/or programs which, while not directly related to energy savings, would provide management information and centralized control, making for more efficient facility operation.

### 3.3.4

#### SUMMARY

It was determined that 96 of the buildings in the Vilseck Subcommunity are technically feasible while meeting the ECIP guidelines for EMCS installation. Total cost estimate for implementation is \$1,945,596.

The estimated energy savings with the recommended EMCS are 780 MBtu of electricity (lighting) and 30,239 MBtu of heating fuel. This represents a 6% reduction of FY 80 basewide energy consumption.

#### ECIP Summary

CWE	\$ 1,886,723
Design Cost	\$ 38,873
Total	\$ 1,945,596

Total Benefits	\$ 4,604,185
Discounted Benefit/Cost Ratio (>1)	2.4
Total Annual Energy Savings	31,019 MBtu
E/C Ratio	16.4
Annual \$ Savings	\$ 357,239
Payback Period	3.3 yr

The proposed new EMCS equipment is to be designed to meet the requirements of the Inter-Agency Guide Specification, a document developed to standardize government procurement of strategies for centralized computer control for energy conservation. To meet this objective a small sized EMCS, according to Specification CIGS-13949, is recommended.

Buildings not recommended either did not meet initial criteria or were determined to be an ineffective application upon physical inspection.

### 3.3.5 EXCLUDED FROM SCOPE OF INVESTIGATION

The scope of the analysis and site investigation is limited only to those considerations which impact on energy. Excluded from consideration are all process, manufacturing or laboratory equipment and systems, as well as fire alarms and security.

### 3.3.6 CONCLUSIONS

In analyzing the 96 applicable buildings in the Vilseck Subcommunity, the installation reflects a total Benefit/Cost ratio of 2.4, an Energy/Cost ratio of 16.4 and payback period of 3.3 years.

Results are in accordance with ECIP B/C >1 and E/C >13 prerequisites for ECO implementation and payback period of less than 13 years.

Strategies in order of cost effectiveness:

- a. Reducing fuel consumption during the heating season by means of temperature setback during unoccupied hours.
- b. Optimized control of boilers.
- c. Lighting reduction/shutdown during unoccupied periods.

### 3.3.7 RECOMMENDATIONS

- a. Implement the installation of an Energy Monitoring and Control System in the Vilseck Subcommunity, Vilseck, West Germany.
- b. The system will consist of one control room to accommodate the facility.
- c. Install the EMCS at the estimated construction cost of \$1,943,596.
- d. Provide a system configuration, programs, and strategies as described in this study.
- e. Note that possible further savings can be realized by the use of EMCS to provide remote controlled space temperatures during normal occupancy periods. Additional savings may be achieved when the EMCS is used to its full potential to provide management reports and maintenance information. These have not been included in the ECIP calculations since they imply future changes in operating procedures which may not be realized.

## 4. INCREMENT F

### 4.1 OBJECTIVES

The objectives of Increment F are summarized as follows:

- a. To recommend modifications and changes in system operation which are within the Facilities Engineer funding authority and management control. Recommendations shall be in the form of specific, practical instructions for the use of Facilities Engineer personnel.
- b. To summarize and establish the priority of all energy conservation measures and projects from Increments A, B, F and G for use of the Community Commander and Facilities Engineer in developing their energy management plans.

The Scope of Work (Schedule of Title Services Rev) is included in Appendix 1-A, Volume 7 of the Prefinal Submittal.

### 4.2 MODIFICATIONS INVESTIGATED

A total of 32 potential modifications were investigated from which we developed twenty-seven recommendation for Building and Maintenance/Operations systems.

Sixteen of the twenty-seven recommendations relate to Building Equipment Systems and are based on an analysis of building field survey data.

Eleven recommendations relate to the Maintenance and Operation (M/O) procedures in use by the Facilities Engineer Division of the Vilseck Subcommunity. The analysis of existing M/O procedures is based on field data consisting of answers to questions put to the Facilities Engineer and members of his staff.

- 4.2.2 Two investigations were developed into recommendations concerning expendable equipment.
- 4.2.3 Two investigations developed into non-recommendations.
- 4.2.4 One investigation did not fall under the Facilities Engineer management control but because it has an easily understandable effect on energy conservation, we have included it as a miscellaneous recommendation.

### 4.3 SUMMARY

The projects investigated are listed, as follows:

#### 4.3.1 MODIFICATIONS TO BUILDING SYSTEMS

<u>SCN PROJECT NO.</u>	<u>DESCRIPTION</u>
F V1	Correct the Installation of the Existing Heat Recovery Wheel.
F V2	Reduce Space Temperatures in Unoccupied Dining Rooms.
F V3	Install Automatic-Vent Damper Controls On Oil-Fired Boilers.
F V4	Boiler Water Treatment.
F V5	Improv. Kitchen Hood Exhaust System.
F V6	Install Vehicle Exhaust System.
F V7	Use Cold Water Cleaning Chemical in Dishwasher Wash Cycle.
F V8	Use Cold Water Detergent For Washing Clothes.
F V9	Install Waste Heat Recovery for Refrigeration Equipment.
F V10	Insulate Heated #6 Oil Storage Tank.
F V11	Reduce the Amount of Heated Space by Building A Partition.
F V12	Replace Damaged Vehicle Doors with Insulated Types.
F V13	Retrofit Interior Fluorescent Lighting With Low Energy Lamps and Ballasts.
F V14	Install Time Clock Control on Laundry Equipment to Allow Only Night Tariff Operation.
F V15	Lower Domestic Hot Water Temperature.

F V16 Change Burner Nozzles for Off-Peak Operation.

4.3.2 MODIFICATIONS TO MAINTENANCE/OPERATIONS SYSTEMS

F V17 Preventive Maintenance Program.

F V18 Temperature Control Technician.

F V19 Reduction of Space Heating Temperatures.

F V20 Interior Lighting Control.

F V21 Window Operation.

F V22 Door Operation.

F V23 Cooking Equipment Warmup.

F V24 Upgrade Centratherm Control System.

F V25 Steam Trap Replacement.

F V26 DHW Circulating System.

F V27 Resize Primary Heating Equipment.

4.3.3 EXPENDABLE EQUIPMENT

F V28 Energy Saving Ovens.

F V29 Energy Saving Motors.

4.3.4 PROJECTS NOT RECOMMENDED

F V30 Installation of Low Energy Fluorescent Lamps and Ballasts to Replace Burned-Out Interior Lighting.

F V31 Use Warm Water Detergent in Dishwasher Wash Cycle.

The above projects are not recommended because they are alternative approaches to ECO's that are recommended. The recommended ECO's have higher E/C ratios. For a detailed analysis see the Energy Report, Final Submittal, Volume 2, Section 4.11.1. The recommended project for alternative F V30 is "Retrofit Interior Fluorescent Lighting With Low Energy Lamps and Ballasts" F V13. The recommended project for alternative F V31 is "Use Cold Water Cleaning Chemical In Dishwasher Wash Cycle", F V7.

#### 4.3.5 MODIFICATION NOT UNDER PE MANAGEMENT CONTROL

F V32 Consolidate Partially Used Barracks.

#### 4.4 INVESTIGATION CONCLUSIONS

The effects, in energy and cost savings, of implementing the above listed modifications are summarized in Table 2-1 of Volume 6 of the Prefinal Submittal, a copy of which is included hereafter.

##### 4.4.1 BUILDING SYSTEMS

Building systems modifications would result in annual energy savings of 29,398 MBtu/yr. and equivalent annual dollars savings of \$294,037/yr (FY 84 escalated). This represents a 9% reduction of FY 80 basewide energy consumption. Implementation costs would amount to \$474,462. The overall payback period is 1.61 years.

##### 4.4.2 MAINTENANCE/OPERATIONS SYSTEMS

Of the eleven M/O systems modifications five have calculable energy and cost savings, and the remaining six are recommendations without calculable savings.

The five modifications having calculable savings (F V18, F V19, F V24, F V25 and F V27), if implemented, would yield a total annual energy savings of 30,060 MBtu/yr and equivalent annual dollar savings of \$342,753/yr. This represents a 9.1% reduction in FY 80 basewide energy consumption.

The energy and cost savings for the six recommendations without calculable savings (F V17, F V20, F V21, F V22, F V23, F V26), are not easily defined. Exact factual data such as hours of occurrence (e.g. how many hours are lights left on in unoccupied spaces or rolling doors left open) could not be determined during a three week survey period. Therefore, these recommendations are general in nature and are made because of their obvious energy savings result.

Of the five modifications with calculable savings, F V19 is a no-cost implementation, F V24, F V25, F V26 have calculable implementation costs, and F V18, F V27 have no calculable implementation costs. Therefore, an overall payback period cannot be calculated for these three recommendations.

Project No.	Description	Application Equipment and Services	W/C Ratio	Rate (1985)	Payback Period	Cost of Equipment (1985)	Cost of Services (1985)	Annual Savings (1985)
F-815	Water Treatment and Water Treatment	Various Buildings	2.175:1	Interest	2.91	633	633	1,010
F-816	Change Filter Systems for W/T-Point Sprinklers	Various Buildings	2.175:1	Interest	2.91	633	633	1,010
F-817	Water Treatment Program	W/T Buildings	-	Interest	0.00	0.00	0.00	0.00
F-818	Temperature Controls Frost Protection	Various Buildings	-	Interest	2.900	1,020	1,020	1,020
F-819	Insulation of Space Heating Components	-	-	Interest	-	94,360	94,360	94,360
F-820	Interior Lighting Control	Various Buildings	-	Interest	-	-	-	-
F-821	Water Treatment Program	W/T Buildings	-	Interest	-	-	-	-
F-822	Water Treatment Program	W/T Buildings	-	Interest	-	-	-	-
F-823	Cooling Equipment Program	Various Buildings	-	Interest	-	-	-	-
F-824	Water Treatment Program	W/T Buildings	-	Interest	-	-	-	-

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INDEPENDENT PROJECT SUMMARY

PROJECT	INVESTMENT	PERIOD	PERIOD	PERIOD	PERIOD	PERIOD	PERIOD
F-17	Reactive Polymer Resistor-Emitting Resistor	Various Buildings					
F-18	Energy Saving Device	Various Buildings					
F-19	Energy Saving Device	Various Buildings					
F-20	Conductive Polyethylene Thread	Various Buildings					
F-21	Blue Gold Water Cleaning Chemical	Various Buildings					
F-22	Water Saving Treatment Device	Various Buildings					
F-23	Water Saving Treatment Device	Various Buildings					
F-24	Water Saving Treatment Device	Various Buildings					
F-25	Reactive Resistor and Recovery Device	Various Buildings					
F-26	Reactive Resistor and Recovery Device	Various Buildings					
F-27	Steam Trap Refrigeration	Various Buildings					

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③ The recommendation for a Temperature Control Technician (F V16) was based on an analysis of a single type of inoperative control condition. Therefore, since more types of inoperative controls are normally encountered, the calculated energy savings are minimal. The uncertainty of the type and amount of inoperative controls that could develop from year to year make it impossible to calculate exact savings.

#### 4.4.3 EXPENDABLE EQUIPMENT

The energy savings for expendable equipment (F V28, F V29) are calculated for a single piece of equipment since no one can predict how many pieces of equipment will fail at a given time. Implementation costs are also on a piece basis and are incremental costs since this is a replacement recommendation, not a retrofit.

#### 4.4.4 MISCELLANEOUS

A practical approach to energy conservation requiring no equipment changes is suggested by the recommendation Consolidate Partially Used Barracks (F V32). This recommendation can produce considerable savings at practically no cost and for these reasons is included in our list of recommendations. Our analysis of four buildings indicates a potential annual energy savings of 1,335 MStu/yr and an equivalent annual dollar savings of \$11,335/yr (FY 84 escalated).

### 4.5 ENERGY CONSERVATION MODIFICATIONS SINCE 1973

A complete listing of energy conservation related projects is given. The listing was updated in April 1982 and is current as of this date.

Many of the projects were not established as specific energy conservation projects. They were the result of normal repair projects that incorporated energy saving features. Therefore they qualified as energy conservation modifications.

The list contains two ECIP projects and fifty seven GMA projects.

#### 4.5.1 GENERAL

A visit was made to the Engineering and Planning Division at Grafenwoehr to obtain data on energy conservation modifications at the Vilseck Subcommunity

since 1975. A review of records uncovered some additional projects. These changes have modified the list of previous energy related projects compiled for the Interim Submittal, presented in Section 2.3.1, Volume 1, of the Interim Submittal. The modified listing is presented in the following section.

#### 4.5.2 PROJECT LISTING

##### ECIP PROJECTS

7T-0173-80\* Attic insulation/installation of thermostatic radiator valves in FH Facilities, 7ATC.  
7T-0155-84\* Automatic Controls with sensors, motorized valves, wiring and small items.

##### OMA PROJECTS

7T-105-73 Repair/replace Heating System, Building No. 333.  
7T-034-74 Repair/replace Heating System, Building No. 308.  
7T-363-74 Repair/replace Heating System, Building No. 344.  
7T-0161-76 Repair/replace Heating System, Building No. 343.  
7T-0162-76 Repair/replace Heating System, Building No. 338.  
7T-0191-76 Repair/replace Heating System, Building No. 201.  
7T-0199-76 Upgrade Central Heating and Electrical Systems, Building No. 432.  
7T-0265-76 Repair/replace Heating System, Electrical System and Long Distance Lines, Buildings No. 131, 132, 133.  
7T-0307-76 Replacement of Radiator Valves, Buildings No. 475 through 478.  
7T-0308-76 Repair/replace Heating System, Building No. 332.

77T-0319-76 Replace Windows, Doors and Entrance  
Doors, Building No. 416.

7T-0041-77 Repair/replace Heating System, Buildings  
No. 306, and 316.

7T-0042-77 Repair/replace Heating System, Buildings  
No. 307 and 317.

7T-0043-77 Repair/replace Heating System, Buildings  
No. 303 and 313.

7T-0044-77 Repair/replace Heating System, Buildings  
No. 304 and 314.

7T-0136-77 Replace Windows, Buildings No. 414, 424,  
425, 433 and 434.

7T-3406-77 Building No. 112. Add ceiling  
insulation. No documents available.

7T-0088-78 Repair/replace Heating System, Building  
No. 431.

7T-0173-78 Repair/replace Heating System, Buildings  
No. 273, 274, and 275.

7T-0270-78 Rehab. heating Building No. 256.  
Received specifications.

7T-0098-79 Roof repair of Buildings No. 252 through  
256.

7T-0099-79 Received work request and specification.

7T-0130-79 Repair doors and insulate ceiling in  
Building No. 308. Received work request  
and specification.

7T-0138-79 Rehab. heating Building No. 224. Design  
in preparation. No documents available.

7T-0439-79 Rehab. of Building No. 427. Received  
work request and specification.

7T-0010-80 Rehab. heating Building No. 339. Design  
in preparation. No documents available.

7T-0036-80 Repair leaky windows in Fitzthum Village.  
Received work request.

7T-0103-80      Central heating of Buildings No. 103, 104, 114 through 117 and 134. Received work request. Design in preparation. No documents available.

7T-0122-80      Rehab. heating system in Building No. 322 (Laundry). Received work request and specification.

7T-0150-80      Rehab. four mess halls in "1,000 man camp". Seen specifications.

7T-0279-80      Replace air conditioning system Building No. 113. Received work request.

7T-0318-80      Replace front doors in Building No. 354 (Theatre). Received work request.

7T-0361-80      Rehab. heating Building No. 324. Seen specification.

7T-0357-80      New lights in Building No. 323 (Gymnasium). Received work request and specification.

7T-0411-80      Rehab. of Heating system in Buildings No. 345 and 346; and connect to heating plant in Building No. 355. Received work request and specification.

7T-0444-80

7T-0413-80

7T-0413-80      Rehab. heating Building No. 260 area. No documents available.

WO-3151-80      Building No. 336 Rehab. Building and heating system, connect to Building No. 355. No documents available.

WO-3156-80      Building No. 224. Replace windows. No documents available.

WO-3179-80      Building No. 264. Install ceiling and wall insulation. No documents available.

WO-3212-80      Building No. 202. Install ceiling insulation, replace windows. No documents available.

WO-3294-80      Building No. 341, 342. Replace roof, add external wall insulating cement. No documents available.

7T-0077-81 Building No. 225 New Windows, New Heating System, Connect to Boiler in Building No. 248. Received work request.

7T-0119-81 Replace single pane windows with double pane thermal glass in the 16 billets and 4 mess halls of "1,000 man camp", and replace old exterior plaster by insulating plaster in the 16 billets. Received copy of work request.

7T-0306-81 Buildings No. 233 and 234. Replace roof, add external wall insulating plaster. No documents available.

7T-0315-81 Buildings No. 231 and 232. Replace roof, add external wall insulating plaster. No documents available.

7T-0316-81 Rehab. heating, Buildings No. 243 and 244. No documents available.

7T-0320-81 Rehab. of Building No. 221. No documents available.

7T-0327-81 Buildings No. 273, 274 and 275. Replace windows. No documents available.

7T-0429-81 Building No. 301: Rehab. heating system, new windows, wall and ceiling insulation, connect to Building No. 355. Building No. 354: Convert steam heating system to hot water, add blowers. No documents available.

WO-3274-81 Building No. 431: Rehab building. No documents available.

WO-3294-81 Building No. 121: Rehab building. No documents available.

\* Project is unfunded or subject to available funds.

#### 4.6

#### INCREMENT PROJECTS BY E/C RATIO

Table 10-1, Volume 6 of the Prefinal Submittal, ranks all the recommended Increment A, B, F and G projects by E/C ratio. A copy is included in this Summary.

## 4.7 FUTURE ENERGY CONSUMPTION

### 4.7.1 GENERAL

In this Section we have analyzed the effect of future facility changes on the energy consumption of the Vilseck Subcommunity. Tables 11-1, 11-2 and 11-3 list the changes in construction in two categories: New Constructions and Demolitions. These tables are included in Appendix 11-B, Volume 7, Prefinal Submittal.

### 4.7.2 AVAILABLE DATA

Vilseck did not have a formalized Master Plan so we developed our estimated future energy use from other data made available to us. The data consisted of:

- a. 7ATC MCA Project Status Report, dated 10 February, 1982.
- b. Building floor areas from 7ATC Master Planning Section, Grafenwoehr.
- c. Design Energy Budgets listed in ETL 1110-3-295.

Since the average heating degree days (HDD) at Vilseck is more than 7,000 per year, Climatic Region No. 1 was selected and used to determine the Design Energy budgets appropriate to the proposed facility changes.

### 4.7.3 ANALYSIS

The estimated energy usage of 1,403,666 SF of new construction is 91,359 MBtu/yr. This is equivalent to 28% of the total energy consumption of FY 80.

The estimated energy reduction from 13,904 SF of demolitions is 998 MBtu/yr. This is equivalent to 0.3% of the total energy consumption of FY 80.

Therefore, the net estimated future energy consumption for the Vilseck Subcommunity is 90,361 MBtu/yr and results from all facilities changes planned up to and including FY 88. This is equivalent to a 27% increase in total energy consumption of FY 80.

It is assumed that all new construction will incorporate required energy conservative features in their designs.

#### 4.8

#### TRAINING COURSES

We have presented in Section 12, Volume 6 of the Prefinal Submittal recommendations on Government and Commercial sponsored training courses. We recommend these courses as additional training for the Vilseck Facilities Engineer Division.

It is not our intent to suggest that this additional training be considered as basic training but rather as refresher or familiarization courses. Training is required to update current knowledge and to learn new technology.

The one course we strongly recommend is the Preventive Maintenance Seminar.

5. ENERGY CONSUMPTION ANALYSIS USING AXCESS COMPUTER PROGRAM (INCR1, A & C ONLY)

5.1 MODELING OF SURVEYED BUILDINGS

Each of the surveyed buildings has been modeled on the AXCESS Input Data Sheets, using field survey data, weather data supplied by EUD, occupancy schedules, building construction data, etc; and the model verified against historical energy use (when available) and adjusted until reasonable agreement is obtained.

5.2 COMPUTER OUTPUT

Each Output consists of three parts:

- a. Input data
- b. Design day space heat gain calculation, (based on 18°C outside air temperature).
- c. Result of the hour-by-hour AXCESS energy consumption calculations. The Result consists of a two page output.

The first page shows the month-by-month consumption values of:

1. Total Source Energy : MBtu
2. Electricity : kWh
3. Anthracite Coal : m<sup>3</sup> tons
4. Fuel Oil No. 2 : gal
5. Fuel Oil No. 6 : gal
6. Interior Lights : kWh
7. Equipment : kWh
8. Misc. Equipment : kWh
9. Fan Power : kWh
10. Domestic Hot Water energy : MBtu (source energy)

The second page shows the month-by-month consumption values of all the above 10 quantities in kBtu/yr/sf of building area.

It also indicates the annual percent of total energy consumption by each of the above 10 quantities.

### 5.3 UTILIZATION OF AXCESS RESULTS

As a result of making an AXCESS analysis of buildings of every type, the average kBtu/yr/sf of each building type has been determined.

Knowing the square foot area of all buildings of each type, energy consumed by all buildings of a given type has been calculated by extrapolation.

By analyzing all types of buildings, the energy consumed by all the buildings in the Subcommunity has been estimated.

### 5.4 AVERAGE ENERGY CONSUMPTION PER BUILDING TYPE

Based on the analysis of the surveyed buildings, the weighted average values of annual source energy consumption per square foot by each of the building types for space heating, domestic hot water, lighting and miscellaneous electric power, are shown in Table 5-1. In Table 5-2, the above values have been expressed as percentages of the total source energy per building type.

#### 5.4.1 GENERAL COMMENTS

We observe that the average total source energy consumption is 190 kBtu/yr/sf of which 34 units (18%) are electrical and 156 units (82%) are fuel.

On an average, a building consumes 136 units for space heating, 20 for DHW, 16 for lighting and 19 for miscellaneous electrical equipment.

Three building types consume more than 200 kBtu/yr/sf for space heating; and as a result of the recommended energy conservation projects, these values will be significantly lowered.

## ENERGY ENGINEERING ANALYSIS PROGRAM, EERPE

29-83-92

## PROGRAM LIST

ENERGY CONSUMPTION : SUMMARIZED RESULTS OF ACCESS PROGRAM  
VILSECK SUBCOMMUNITY

Table 5-1

- AVERAGE ENERGY CONSUMPTION BY BLDG TYPE -  
- KBTU PER SQUARE FOOT PER YEAR -

DESCR	TYP	QSF	TOTAL ENERGY	REL		SPACE HEAT	WAT	LIGHT	HEC:	HEC LT/SCP	BOILER	ACTUAL	
				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-
EV/B02	1	377272.	139.3	114.3	25.0	84.7	29.7	13.3	9.4	1.1	8.2	131.6	
HOSPITAL	2	55296.	116.2	113.5	2.7	113.5	9.0	2.7	0.0	0.0	0.0	100.4	
EV/MESS	3	44899.	294.2	260.1	34.1	170.0	10.1	12.7	21.4	0.0	21.4	273.2	
FAIR HALL	5	235148.	243.9	129.9	59.0	154.4	36.6	22.9	30.1	26.6	3.5	190.4	
FAIR HALL N	6	37720.	146.9	97.6	49.3	73.5	24.1	19.3	39.0	11.7	18.3	107.0	
SCHOOL	7	32461.	193.3	167.0	29.3	163.7	9.3	21.7	6.4	0.0	6.4	173.3	
THEATER	9	10463.	293.9	252.3	41.6	231.5	9.8	7.9	33.7	19.7	14.6	232.2	
LAUNDRY	10	11184.	260.3	203.1	57.4	175.6	27.3	4.2	33.2	42.4	10.8	213.0	
ADM RPR	11	109736.	264.4	262.7	31.7	256.9	9.8	19.7	16.0	4.4	11.6	247.8	
GYMNASIUM	12	37737.	222.3	202.2	29.3	277.4	24.9	13.6	6.7	0.0	6.7	333.3	
CAPEL	13	4431.	177.7	152.3	25.9	151.5	0.7	10.4	13.1	0.0	13.1	151.3	
POOLING	14	11741.	222.3	181.3	42.0	180.7	9.6	7.7	34.1	27.7	6.4	171.1	
COMISARY	15	40254.	216.0	180.2	105.8	177.9	2.3	24.3	71.5	56.7	14.2	190.8	
ADMISTPA	16	94127.	138.8	127.3	31.2	114.4	12.9	12.3	12.9	3.6	12.2	66.4	
APPL LHS	17	223452.	179.2	160.2	19.0	159.3	6.7	10.3	6.7	0.7	6.0	167.2	
WAREHOUSE	18	94531.	146.0	143.8	20.2	144.3	1.9	6.2	15.9	1.0	15.0	149.3	
EV/MESS	19	30727.	270.9	173.7	73.2	153.1	22.6	32.7	62.5	53.4	6.9	209.4	
FAIR HALL	20	6378.	210.6	161.7	54.9	157.3	4.2	17.4	39.3	6.0	39.3	152.2	
DISPENSARY	21	7456.	114.3	80.3	34.0	75.1	2.2	17.2	16.8	0.0	16.8	106.2	
TELECOM	22	6222.	273.0	170.9	105.0	176.0	6.0	22.0	63.0	61.0	22.0	136.9	
FAIR HALL N	24	126736.	148.4	91.7	51.5	60.2	36.7	17.4	34.1	27.2	6.9	91.1	
SUBTOTAL			189.4	155.3	25.0	134.4	21.1	13.7	19.3	10.4	9.9	163.5	0.2
AVERAGE													

\* NOTE: Space heating includes dryer energy consumption.

## DESY ENGINEERING ANALYSIS PROGRAM: REPORT

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### FAREWELL LIST

## SECRET INFORMATION | EXCLUDING RESULTS OF ACCESS PROCEDURE

Table 5-2

## WILSEY'S INDEPENDENCE

## • פְּנִימָה וְבְּדִילָה כְּמִזְרָחָן וְבְּמִזְרָחָן •

## PROGRAM LIST

## HEATING DEFINITION

Tables 5-1 and 5-2

COLUMN	EXPLANATION
-1-	DESCRIP : DESCRIPTION OF BUILDING TYPE
-2-	TYP : DESIGNATED TYPE NUMBER FROM INCLEMENT 'A'
-3-	GSF : TOTAL GROSS SQUARE FOOTAGE FOR BUILDINGS OF THE PARTICULAR TYPE
-4-	TOTAL : TOTAL ENERGY CONSUMPTION PER TYPE (BTU/SF) PER YEAR COLUMN (5) + COLUMN (6)
-5-	FUEL : TOTAL FUEL CONSUMPTION PER TYPE (BTU/SF) PER YEAR COLUMN (7) + COLUMN (8)
-6-	EEC : TOTAL ELECTRICITY CONSUMPTION PER TYPE (BTU/SF) PER YEAR COLUMN (9) + COLUMN (10)
-10-	EEC : MISCELLANEOUS CONSUMPTION OF ELECTRICITY COLUMN (11) + COLUMN (12)
-11-	LP/ESP : INCLUDES EXTERIOR, LIGHTING AND EQUIPMENT SUCH AS LAUNDRY MACHINES, COOKING EQUIPMENT, AND MISCELLANEOUS HOUSEHOLD EQUIPMENT.
-12-	BOILER : INCLUDES BOILER PIPES, BOILER MOTORS, UNIT WATER FANS AND SURFACE FANS.
-13-	ACTUAL : ACTUAL ENERGY FUEL CONSUMPTION. DOES NOT INCLUDE ELECTRICITY.

## 5.5

### TOTAL ENERGY CONSUMPTION PER BUILDING TYPE AND BY ENTIRE SUBCOMMUNITY

The annual values of total fuel (coal or oil) consumption (MBtuF), electricity consumption (MWh and equivalent source (MBtuE)) as well as total energy (fuel and electricity consumption (MBtuT)) by each type of building have been determined, as shown in Table 5-3, using the average values per building type and the GSF area of the type.

The "miscellaneous" consumption consists of the consumption by items such as Street Lighting, Sewage Treatment Plant and Water Pump Station.

Table 5-3 also shows the percent of total fuel, total electricity and total energy, consumed by each of the building types.

#### 5.5.1 GENERAL COMMENTS

##### 5.5.1.1 FUEL CONSUMPTION

We observe that the topmost consumers of fuel (coal and oil) are the following building types:

Family Housing	= 24.2%
EM Barracks w/o Mess	= 17.8%
Applied Instruction	= 14.0%
Motor/Tank Repair	= 13.2%

These building types consume 70% of the total fuel.

##### 5.5.1.2 ELECTRICITY CONSUMPTION

The leading consumers of electricity are the following building types:

Family Housing	= 35.5%
EM Barracks w/o Mess	= 16.1%
Applied Instruction	= 6.9%
Commissary	= 6.7%
Motor/Tank Repair	= 6.6%

DEPLOY ENGINEERING ANALYSIS PROGRAM, EUROPE  
PROGRAM LISTED  
VILSECK SUBCOMMUNITY

1. IN-SERVICE EXTRAPOLATED ENERGY CONSUMPTION  
10-10-82  
Table 5-3

TYPE NO. -1- -2-	OSF -3-	KWH/FT <sup>2</sup> -4-	AVG PER SF/YR -5- +6-		KWH/FT <sup>2</sup> -7-	KWH/YR -8-	KWH/YR -9-	KWH/YR -10-	KWH/YR -11-	KWH/YR -12-	PERCENTAGE ELEC TOTAL -13- -14-	
			1	2								
1 24.	399272.	114.3	25.0	179.3	1945.	9762.	53407.	17.6	13.7	17.2	23.7	81/309
2 16.	53296.	113.3	2.7	116.2	6276.	149.	4423.	2.4	0.2	2.0	3.7	HOSPITAL
3 6.	46879.	360.1	34.1	294.2	12198.	1999.	13798.	4.7	2.5	4.3	2.0	OFFICES
5 18.	235148.	195.9	52.0	247.9	4499.	12449.	57340.	17.2	19.7	17.0	16.0	OFFICES
6 3.	37920.	97.6	49.3	146.9	3791.	1849.	5370.	1.4	3.0	1.7	2.3	OFFICES
7 2.	32461.	167.0	28.3	195.3	5421.	919.	4340.	2.1	1.3	2.0	1.9	SCHOOL
9 1.	10483.	282.3	41.6	293.9	2645.	136.	3052.	1.0	0.7	1.0	0.4	THEATER
10 6.	11184.	203.1	57.4	240.5	2772.	142.	2714.	0.9	1.0	0.9	0.7	LAUNDRY
11 11.	106934.	262.7	31.7	274.4	2727.	3254.	31153.	10.7	5.3	9.7	6.3	NOTE RPT
12 2.	37339.	372.2	20.3	322.9	11324.	762.	12104.	4.4	1.2	3.8	2.2	GYMNASIUM
13 1.	6431.	152.2	25.3	177.7	1099.	169.	1178.	0.4	0.3	0.4	0.4	CHAPEL
14 1.	11741.	181.3	42.0	223.3	2129.	473.	3622.	0.8	0.8	0.8	0.7	BORN. INC
15 4.	46858.	190.2	103.0	206.0	7362.	4222.	11624.	2.8	6.8	3.6	2.4	COMISARY
16 19.	24187.	127.5	31.2	158.6	10737.	2629.	13346.	4.1	4.2	4.1	3.0	ADMINSTR
17 23.	233452.	160.2	19.0	177.2	32432.	4446.	41590.	14.4	7.0	13.0	10.9	APL. ENG
18 8.	64531.	145.6	20.1	166.0	12613.	1744.	14362.	4.9	2.8	4.5	3.1	OFFICE
19 3.	38727.	175.7	95.2	270.9	6075.	3459.	10470.	2.6	9.8	3.3	2.3	OFFICES
20 1.	4278.	161.7	94.9	218.6	1031.	367.	1374.	0.4	0.4	0.4	0.4	FIRE HSE
21 1.	7474.	89.3	24.0	114.3	394.	254.	852.	0.2	0.4	0.3	0.4	DISPENS
22 1.	6222.	170.0	103.0	273.0	1059.	653.	1711.	0.4	1.0	0.5	0.4	TELECOM
24 8.	168071.	95.9	51.5	143.4	16076.	8534.	24443.	6.2	13.5	7.6	9.9	OFFICES
25 0.	0.	0.0	0.0	0.0	0.	3831.	2831.	0.0	1.1	1.2	0.0	OFFICES
153.	1617401.	153.3	37.3	191.3	29313.	6312.	322422.	100.0	100.0	100.0	100.0	81/240
		157.9	42.8	190.7	294034.	74112.	330152.	100.0	100.0	100.0	100.0	81/240
70 10.	OSF -1- -2-	10118.	0.878	0.717	0.978	0.70	0.978	0.67	0.67	0.67	0.67	81/240

DATA ENGINEERING ANALYSIS PROGRAM: EUROPE  
PROGRAM LISTS  
VILSECK SUBCOMPARTY

1. PREVIOUS ESTIMATED ENERGY CONSUMPTION

10-SEP-72

Table 3-3

MEASUREMENT DEFINITIONS

1. TYP	: BUILDING TYPE AS DEFINED BY INDEX 'N'
2. NO.	: TOTAL NUMBER OF BUILDINGS PER TYPE
3. GSF	: TOTAL GROSS SQUARE FOOTAGE PER TYPE
4. FSTFUE	: AVERAGE YEARLY CONSUMPTION OF FUEL (COAL/OIL) ON A PER SQUARE FOOT BASIS IN BTU (BTU/1000)
5. FSTEUC	: AVERAGE YEARLY CONSUMPTION OF ELECTRICITY ON A PER SQUARE FOOT BASIS IN BTU (BTU/1000)
6. FSTTOT	: AVERAGE YEARLY ENERGY CONSUMPTION ON A PER SQUARE FOOT BASIS IN BTU (BTU/1000) COLUMN (4) + COLUMN (5)
7. MFTFUE	: TOTAL YEARLY FUEL (COAL/OIL) CONSUMPTION IN BTU (BTU/1000000) COLUMN (2) * COLUMN (4)
8. MFTEUC	: TOTAL YEARLY ELECTRICITY CONSUMPTION IN BTU (BTU/1000000) COLUMN (3) * COLUMN (5)
9. MFTTOT	: TOTAL YEARLY ENERGY CONSUMPTION IN BTU (BTU/1000000) COLUMN (2) * COLUMN (6)

PERCENTAGE :

10. FUEL	: PERCENT OF FUEL CONSUMED IN RELATION TO TOTAL BASE CONSUMPTION COL. (7) / 100/1000000 FUEL CONSUMPTION
11. ELEC	: PERCENT OF ELECTRICITY CONSUMED IN RELATION TO TOTAL BASE CONSUMPTION COL. (8) / 100/1000000 ELEC. CONSUMPTION
12. TOTAL	: PERCENT OF TOTAL ENERGY CONSUMED IN RELATION TO TOTAL BASE CONSUMPTION COL. (9) / 100/1000000 ENERGY CONSUMPTION
13. GSF	: PERCENT OF GROSS SQUARE FOOTAGE IN RELATION TO 1000000 BASE SQUARE FOOTAGE COL. (3) / 100/1000000 SF
14. DESCRIPT	: DESCRIPTION OF BUILDING USE PER TYPE

Officers Mess/Club                           • 5.7%

Administration                               • 4.1%

These building types consume 8.2% of the total electricity consumption.

#### 5.6 PRESENT AND PROJECTED ENERGY COSTS

Based on the average energy consumption values obtained we have developed and shown the present FY 80 as well as projected FY 84 energy costs (if no energy conservation actions are implemented) for space heating, DHW, lighting, miscellaneous, and total energy for each building type in Tables 5-4A and 5-4B.

##### 5.6.1 GENERAL COMMENTS

We observe that on an average, the annual energy cost is 93 cents per square foot, of which 65 cents is for space heating, 10 cents is for DHW, 8 cents for lighting and 10 cents for miscellaneous electrical equipment such as boiler pumps, unit heater fans, washing machines and stoves.

Between FY 1980 and FY 1984, the energy cost will increase by a factor of 1.6 if no energy conservation measures are implemented; i.e., the annual energy cost will increase from approximately \$1.2 million to \$1.9 million.

ENERGY ENGINEERING ANALYSIS PROGRAM: EUROPE  
 PROGRAM LIST6  
 VILSECK SUBCOUNTRY

ED-922-42

Table 5-4A

ENERGY COST-1980: CENTS/100 FT

BLDG TYPE	BLDG DESC	SF	SPACE HEAT	FUEL		ELECTRIC COST		TOTAL
				MM	RNG	LIGHTS	NISC	
COSTS/100 FT. 1980								
1	EDUC	399222.	41.	14.	6.	3.	48.	
2	HOSPITALS	53296.	55.	6.	1.	0.	56.	
3	ED HOSP	44499.	62.	43.	7.	11.	163.	
5	FAIR MSNG	228148.	74.	19.	12.	16.	119.	
6	FR HSG N	17733.	25.	12.	10.	15.	72.	
7	SCHOOL	52441.	79.	2.	11.	2.	95.	
9	THEATER	16442.	121.	0.	4.	17.	143.	
10	LAUNDRY	11186.	64.	19.	2.	27.	127.	
11	NOTE RPR	109736.	124.	3.	8.	6.	143.	
12	GYMNASIUM	37339.	133.	12.	7.	2.	156.	
13	CHAPEL	6431.	73.	0.	5.	8.	84.	
14	BOATING	11741.	67.	0.	4.	18.	109.	
15	COMISSARY	40853.	64.	1.	18.	37.	141.	
16	ARMY STRA	84187.	55.	6.	9.	7.	77.	
17	APT. INS	273457.	77.	9.	5.	5.	87.	
18	HOUSE	84531.	49.	1.	2.	6.	81.	
19	OFF HSG	39727.	74.	11.	17.	32.	124.	
20	PIPE HSE	6378.	76.	2.	9.	29.	107.	
21	DISPENS	7056.	59.	-	9.	7.	56.	
22	TELEPH	6222.	62.	-	11.	43.	126.	
24	FR HSG N	124922.	27.	18.	9.	10.	73.	
AVERAGE								
				45.	10.	9.	10.	73.

ENERGY ENGINEERING ANALYSIS PROGRAM, EUROPE  
 MCPLAN LIST6  
 VILSECK SUBCOUNTRY

30-SEP-72

Table S-4B

ENERGY COST-1974: CENTS/SQ FT

BLDG TYPE	BLDG DESC	REF	SPACE HEAT	FUEL			ELECTRICITY			TOTAL	
				FUEL			ELECTRICITY				
				DMH	LIGHTS	RISE	DMH	LIGHTS	RISE		
CENTS/SQ FT, 1974											
1	OFFICE	399272.	66.	23.	13.	6.	111.				
2	HOSPITAL	55276.	89.	0.	2.	0.	91.				
3	EN. RESS	44877.	133.	71.	11.	18.	233.				
5	FAB. WSHG	233142.	121.	29.	19.	25.	194.				
6	FI. HSE 4	37920.	59.	19.	16.	23.	118.				
7	SCHOOL	32461.	123.	2.	13.	3.	133.				
9	THEATER	10473.	197.	1.	7.	21.	233.				
10	LAUNDRY	11116.	139.	22.	4.	45.	209.				
11	WTR. PDR	105934.	201.	5.	13.	13.	233.				
12	GYMNASI	37539.	217.	19.	11.	6.	234.				
13	CHAPL.	6631.	119.	1.	9.	13.	141.				
14	ROLLING	11741.	142.	0.	7.	61.	177.				
15	CONISARY	49859.	137.	2.	29.	60.	230.				
16	APPL. FAB	84 27.	99.	10.	15.	11.	124.				
17	APPL. LNS	224 52.	123.	1.	9.	7.	142.				
18	WASH.	86731.	113.	1.	4.	13.	131.				
19	OFF. RESS	36717.	127.	18.	27.	35.	216.				
20	FIRE HSE	1378.	121.	2.	15.	73.	173.				
21	CISIMARY	7456.	61.	2.	14.	14.	92.				
22	TELE. COPI	6222.	123.	0.	19.	70.	222.				
24	FI. HSE 4	126729.	47.	29.	19.	29.	119.				
AVERAGE				103.	17.	13.	16.	151.			

6.

INFORMATION RECEIVED FROM SUBCOMMUNITY

We have presented in Section 2 of the Energy Report details of the following:

- a. Drawings
- b. Utility and Fuel Bills
- c. Information of Previous Studies
- d. Building Information Schedule
- e. Basic Utility System Maps
- f. Facility Engineering Technical Data Report
- g. Subcommunity Fixed Facility Energy Plan
- h. Land Use Plan and Planned Physical Plant Expansion Data
- i. Population Data

7. ENERGY CONSUMPTION DATA AND SUBCOMMUNITY GOALS

Presented herein are the following tables:

Table 3.3-1 Fuel and Electricity Prices

Table 3.3-2 Annual Energy Consumption and Cost Profile  
for FY 75, 78, 79 and 80

Table 3.2-1 Energy Consumption Goals for FY 85

Table 3.4 Vilseck Typical building Energy  
Consumption

## VILSECK

Table 3.3-1

## FY 84 FUEL PRICES, BASED ON FUEL PRICES IN FY 81

FUEL	UNIT	FY 81		FY 84	
		\$/UNIT	\$/MBTU	\$/UNIT	\$/MBTU
ELECTRICITY	KWH	0.08	6.396	0.12	9.950
COAL	m-TON	127	4.071	169	5.419
NO. 2 OIL	GAL	1.22	8.796	1.91	13.032
NO. 6 OIL	GAL	0.87	5.860	1.29	8.682
ELECTRIC DEMAND	KVA	9.50	--	13.707	--

CONVERSION FACTORS:  $(10)^6$   $\frac{\text{BTU}}{\text{MBTU}}$

0.0114 MBTU ELECTRICITY  
KWH

31.2 MBTU COAL  
m-TON

0.1387 MBTU NO. 2 OIL  
GAL

0.1485 MBTU NO. 6 OIL  
GAL

ATTACHMENT TO TABLE 3.3-1

BACKUP - USEFUL DATA

ANNUAL ESCALATION RATES PER "ECIP"				
FUEL	FY 81	FY 82	FY 83	FY 84
ELECTRICITY	13%	13%	13%	13%
COAL	10%	10%	10%	10%
OIL	14%	14%	14%	14%

CONVERSION FACTORS	
1 US DOLLAR	= 2 DM
28.3 Mbtu	/short ton of Anthracite Coal
1 short ton	= 937.1847 kg
1 m-ton	= 1000.0000 kg
1 gallon	= 3.785 liters
1 US DOLLAR per gallon	= 0.5284 DM per liter

SABIA 3.2-2

THE COST OF COMMUNISM - VOLUME II

TABLE 2-2. LAND USE CONSTRUCTION - MUNICIPAL AND GOALS FOR 1980, MILLION

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	20100	20101	20102	20103	20104	20105	20106	20107	20108	20109	20110	20111	20112	20113	20114	20115	20116	20117	20118	20119	20120	20121	20122	20123	20124	20125	20126	20127	20128	20129	20130	20131	20132	20133	20134	20135	20136	20137	20138	20139	20140	20141	20142	20143	20144	20145	20146	20147	20148	20149	20150	20151	20152	20153	20154	20155	20156	20157	20158	20159	20160	20161	20162	20163	20164	20165	20166	20167	20168	20169	20170	20171	20172	20173	20174	20175	20176	20177	20178	20179	20180	20181	20182	20183	20184	20185	20186	20187	20188	20189	20190	20191	20192	20193	20194	20195	20196	20197	20198	20199	20200	20201	20202	20203	20204	20205	20206	20207	20208	20209	20210	20211	20212	20213	20214	20215	20216	20217	20218	20219	20220	20221	20222	20223	20224	20225	20226	20227	20228	20229	20230	20231	20232	20233	20234	20235	20236	20237	20238	20239	20240	20241	20242	20243	20244	20245	20246	20247	20248	20249	20250	20251	20252	20253	20254	20255	20256	20257	20258	20259	20260	20261	20262	20263	20264	20265	20266	20267	20268	20269	20270	20271	20272	20273	20274	20275	20276	20277	20278	20279	20280	20281	20282	20283	20284	20285	20286	20287	20288	20289	20290	20291	20292	20293	20294	20295	20296	20297	20298	20299	20300	20301	20302	20303	20304	20305	20306	20307	20308	20309	20310	20311	20312	20313	20314	20315	20316	20317	20318	20319	20320	20321	20322	20323	20324	20325	20326	20327	20328	20329	20330	20331	20332	20333	20334	20335	20336	20337	20338	20339	20340	20341	20342	20343	20344	20345	20346	20347	20348	20349	20350	20351	20352	20353	20354	20355	20356	20357	20358	20359	20360	20361	20362	20363	20364	20365	20366	20367	20368	20369	20370	20371	20372	20373	20374	20375	20376	20377	20378	20379	20380	20381	20382	20383	20384	20385	20386	20387	20388	20389	20390	20391	20392	20393	20394	20395	20396	20397	20398	20399	20400	20401	20402	20403	20404	20405	20406	20407	20408	20409	20410	20411	20412	20413	20414	20415	20416	20417	20418	20419	20420	20421	20422	20423	20424	20425	20426	20427	20428	20429	20430	20431	20432	20433	20434	20435	20436	20437	20438	20439	20440	20441	20442	20443	20444	20445	20446	20447	20448	20449	20450	20451	20452	20453	20454	20455	20456	20457	20458	20459	20460	20461	20462	20463	20464	20465	20466	20467	20468	20469	20470	20471	20472	20473	20474	20475	20476	20477	20478	20479	20480	20481	20482	20483	20484	20485	20486	20487	20488	20489	20490	20491	20492	20493	20494	20495	20496	20497	20498	20499	20500	20501	20502	20503	20504	20505	20506	20507	20508	20509	20510	20511	20512	20513	20514	20515	20516	20517	20518	20519	20520	20521	20522	20523	20524	20525	20526	20527	20528	20529	20530	20531	20532	20533	20534	20535	20536	20537	20538	20539	20540	20541	20542	20543	20544	20545	20546	20547	20548	20549	20550	20551	20552	20553	20554	20555	20556	20557	20558	20559	20560	20561	20562	20563	20564	20565	20566	20567	20568	20569	20570	20571	20572	20573	20574	20575	20576	20577	20578	20579	20580	20581	20582	20583	20584	20585	20586	20587	20588	20589	20590	20591	20592	20593	20594	20595	20596	20597	20598	20599	20600	20601	20602	20603	20604	20605	20606	20607	20608	20609	20610	20611	20612	20613	20614	20615	20616	20617	20618	20619	20620	20621	20622	20623	20624	20625	20626	20627	20628	20629	20630	20631	20632	20633	20634	20635	20636	20637	20638	20639	20640	20641	20642	20643	20644	20645	20646	20647	20648	20649	20650	20651	20652	20653	20654	20655	20656	20657	20658	20659	20660	20661	20662	20663	20664	20665	20666	20667	20668	20669	20670	20671	20672	20673	20674	20675	20676	20677	20678	20679	20680	20681	20682	20683	20684	20685	20686	20687	20688	20689	20690	20691	20692	20693	20694	20695	20696	20697	20698	20699	20700	20701	20702	20703	20704	20705	20706	20707	20708	20709	20710	20711	20712	20713	20714	20715	20716	20717	20718	20719	20720	20721	20722	20723	20724	20725	20726	20727	20728	20729	20730	20731	20732	20733	20734	20735	20736	20737	20738	20739	20740	20741	20742	20743	20744	20745	20746	20747	20748	20749	20750	20751	20752	20753	20754	20755	20756	20757	20758	20759	20760	20761	20762	20763	20764	20765	20766	20767	20768	20769	20770	20771	20772	20773	20774	20775	20776	20777	20778	20779	20780	20781	20782	20783	20784	20785	20786	20787	20788	20789	20790	20791	20792	20793	20794	20795	20796	20797	20798	20799	20800	20801	20802	20803	20804	20805	20806	20807	20808	20809	20810	20811	20812	20813	20814	20815	20816	20817	20818	20819	20820	20821	20822	20823	20824	20825	20826	20827	20828	20829	20830	20831	20832	20833	20834	20835	20836	20837	20838	20839	20840	20841	20842	20843	20844	20845	20846	20847	20848	20849	20850	20851	20852	20853	20854	20855	20856	20857	20858	20859	20860	20861	20862	20863	20864	20865	20866	20867	20868	20869	20870	20871	20872	20873	20874	20875	20876	20877	20878	20879	20880	20881	20882	20883	20884	20885	20886	20887	20888	20889	20890	20891	20892	20893	20894	20895	20896	20897	20898	20899	20900	20901	20902	20903	20904	20905	20906	20907	20908	20909	20910	20911	20912	20913	20914	20915	20916	20917	20918	20919	20920	20921	20922	20923	20924	20925	20926	20927	20928	20929	20930	20931	20932	20933	20934	20935	20936	20937	20938	20939	20940	20941	20942	20943	20944	20945	20946	20947	20948	20949	20950	20951	20952	20953	20954	20955	20956	20957	20958	20959	20960	20961	20962	20963	20964	20965	20966	20967	20968	20969	20970	20971	20972	20973	20974	20975	20976	20977	20978	20979	20980	20981	20982	20983	20984	20985	20986	20987	20988	20989	20990	20991	20992	20993	20994	20995	20996	20997	20998	20999	209999



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TABLE 3.4  
VILSECK TYPICAL BUILDING  
ENERGY CONSUMPTION

<u>TYPE</u>		<u>DESCRIPTION</u>		<u>MBTU/YR</u>
			<u>ELEC</u>	<u>FUEL</u>
1	252	EM BARRACKS WD/ME38	237	2895
2	152	HUTMENTS	9	345
3	161	EM MESS	159	1285
5	433	FAMILY HOUSING	350	1025
6	429	FAMILY HOUSING (NEW)	623	1352
7	420	DEPENDENT GRADE SCHOOL	442	2690
9	354	THEATER	436	2644
10	322	LAUNDRY	642	2392
11	308	MOTOR/TANK REPAIR	975	9145
12	323	GYMNASIUM	456	7487
13	218	CHAPEL	169	1003
14	215	BOWLING	493	2008
15	217	RETAIL STORE/COMMISARY	1215	2865
16	365	ADMINISTRATION	95	1209
17	345	APPLIED INSTRUCTION	170	1783
18	134	STOREHOUSE/WAREHOUSE	231	1685
19	133	OPEN MESS/NCO	1261	2976
20	201	FIRE STATION	363	977
21	301	DISPENSARY	253	1403
22	422	TELEPHONE EXCHANGE	653	864
24	840	FAMILY HOUSING (OFF BASE)	170	3009

8.

**DATA COLLECTED BY BUILDING SURVEY AND SELECTION OF  
REPRESENTATIVE BUILDINGS (INCREMENTS A & C ONLY)**

The following data has been presented in detail in the Energy report and was originally presented in the Preliminary Submittal:

Building Envelope Construction Data.

Occupancy, Lighting, Equipment and DHW Data.

Terminal Heating Systems and Control Data.

Primary Heating Systems Data.

Possible Energy Conservation Opportunities.

We have presented in the following table an updated list of representative buildings of each type selected for detailed Energy Conservation Analysis. In some types, we have selected more than one building for analysis in order to obtain more realistic basewide extrapolated ECIP or CMA projects.

Table 4.8  
REPRESENTATIVE BUILDINGS OF EACH TYPE  
 VILSECK

TYPE	BUILDING TYPE DESCRIPTION	BUILDING
1	EM BARRACKS W/O MESS, BOQ	292
2	HUTMENTS	192
3	EM. MESS	161
5	FAMILY HOUSING	433
6	FAMILY HOUSING (NEW)	429
7	DEPENDENT GRADE SCHOOL	480
9	THEATRE	354
10	LAUNDRY	322
11	MOTOR/TANK REPAIR SHOP	205, 308
12	GYMNASIUM	323
13	CHAPEL	218
14	BOWLING CENTER	215
15	RETAIL STORE/COMMISSARY	217
16	ADMINISTRATION	265
17	APPLIED INSTRUCTION	343, 349
18	STOREHOUSE/WAREHOUSE	134
19	OPEN MESS NCO/CLUB	133
20	FIRE STATION	201
21	DISPENSARY	301
22	TELEPHONE EXCHANGE	432
24	FAMILY HOUSING (OFF-BASE)	840